This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-023422
(43)Date of publication of application : 23.01.1996

---

(51)Int.CI. H04N 1/113
H04N 1/23
H04N 1/409

---

(21)Application number : 06-154592
(22)Date of filing : 06.07.1994

(71)Applicant : DAINIPPON SCREEN MFG CO LTD
(72)Inventor : NARUO MITSUHIKO

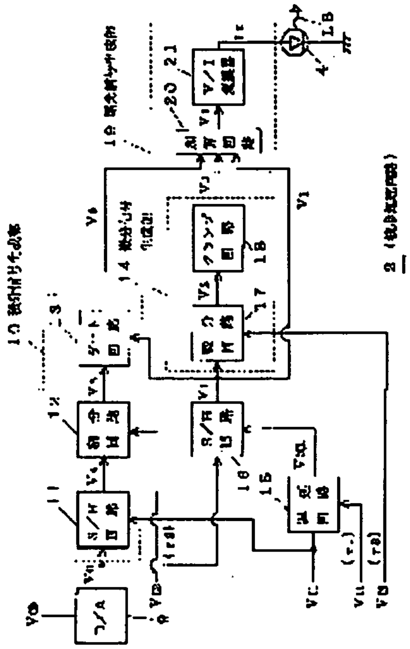
---

(54) IMAGE RECORDING DEVICE

(57)Abstract:

PURPOSE: To sharpen an edge of density in a contour part by increasing the brightness of a light source when the contour of an image recorded on a sensing material is exposed.

CONSTITUTION: A differentiation circuit 17 uses a pixel clock signal VCL delayed by a time constant t1 to differentiate a binary image signal V1 subject to sampling and holding at a time constant t3 and the differentiation signal V2 is clamped, resulting that a signal V3 is a differentiation signal with positive polarity. An integration circuit 12 starts integration processing at a time constant t2(>t1) synchronously with the falling of the binary image signal subject to salmpling and holding by using the pixel clock signal VCL, its integration signal V5 is limited by a gate circuit 13, resulting that a signal V6 integrated by the time constant t1 is obtained. Thus, a signal VE is obtained by adding the differentiation signal V3 and the integration signal V6 to the binary image signal V1 and has a level of ternary or over, and the luminous quantity of a light beam just after the start of light emission and just before the stop of light emission is increased. As a result, the exposure on a photosensing face is uniformalized.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] In the image recording equipment which records a picture by scanning a light beam to a sensitized material A binary-ized picture signal output means to output the binary-ized picture signal which has the 2nd level which serves as size from the 1st level and the 1st level of the above, A differential signal generation means to generate the differential signal which appears when changing from the 1st level of the above to the 2nd level of the above among the signals which differentiate the aforementioned binary-ized picture signal and are acquired based on level change of the aforementioned binary-ized picture signal, An exposure signal generation means to generate the exposure signal which has the 3rd level which compounds the aforementioned binary-ized picture signal and the aforementioned differential signal, and serves as size from the 1st level of the above, the 2nd level of the above, and the 2nd level of the above, Image recording equipment characterized by having a light beam discharge means to emit the aforementioned light beam of the quantity of light according to each level of the impressed aforementioned exposure signal.
[Claim 2] Within a time [of the time of the 2nd level change on the 1st level of the above of the aforementioned binary-ized picture signal from the 2nd level of the above from the time of only predetermined time having passed since the time of the 1st level change on the 2nd level of the above of the aforementioned binary-ized picture signal from the 1st level of the above] integrates with a predetermined signal. It has further an integration signal generation means to output the integration signal generated by the integration concerned. the aforementioned differential signal generation means It is a means to be a time constant shorter than the aforementioned predetermined time, with to generate the aforementioned differential signal which synchronized with the 1st level change of the aforementioned binary-ized picture signal. the aforementioned exposure signal generation means Image recording equipment according to claim 1 characterized by being a means to generate the aforementioned exposure signal by composition with the aforementioned binary-ized picture signal, the aforementioned differential signal, and the aforementioned integration signal.
[Claim 3] A 1st differential signal generation means by which the aforementioned differential signal generation means generates the aforementioned differential signal according to the 1st level change on the 2nd level of the above of the aforementioned binary-ized picture signal from the 1st level of the above, A 2nd differential signal generation means to generate the aforementioned differential signal based on the aforementioned binary-ized picture signal to within a time [of the time of the 2nd level change on the 1st level of the above of the aforementioned binary-ized picture signal from the 2nd level of the above from the time of only predetermined time having passed since the time of the aforementioned 1st level change] Image recording equipment according to claim 1 characterized by being the means to include.
[Claim 4] It is image recording equipment which records a picture for the light beam by which the quantity of light was controlled on the aforementioned sensitized material a scan and by exposing to a sensitized material with an exposure signal. as the aforementioned exposure signal While changing from the 1st level equivalent to the aforementioned exposure level to the 2nd level through the 3rd level It is image recording equipment with which the signal which changes

from the 2nd level of the above to the 1st level of the above again through the 3rd level of the above is used after that, and the above 1st, the 2nd, and 3rd level is moreover characterized by the thing of <(1st level of the above) (2nd level of the above) < (the 3rd level of the above) for which a relation is satisfied.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the image recording equipment which records a picture like the output scanner for platemaking, or a LASER beam printer by the scan of a light beam in which lighting control is carried out by the picture signal. Especially this invention is used as technology for improving shortage of the light exposure in the profile section of the picture recorded on a sensitized material.
[0002]
[Description of the Prior Art] In the image recording equipment represented by the output scanner for platemaking etc., lighting of the light beam which emits light from the light source for exposure is controlled by the binary-ized picture signal generated based on the image data of the subject copy which should be recorded.
[0003] And when a light beam moves the light source for exposure, or a sensitized material, the exposure side top of a sensitized material is scanned, and a picture is exposed and recorded by the sensitized material by this. Since a binary-ized picture signal is a signal which has binary [of L level and H level] here, the quantity of light of the light beam which has a sensitized material scanned when the level is in L level is 0, and when the above-mentioned level is in H level to it, the quantity of light of a light beam has with the value voltage which it was beforehand set up, for example, is impressed to the light source for exposure which consists of laser diode, light emitting diode, etc. considerable the bottom.
[0004]
[Problem(s) to be Solved by the Invention] The amount of [in the light source for exposure] light-emitting part has a certain limited area, and the quantity of light of the light beam which emitted light from the light source for exposure has accomplished a certain distribution. For example, when a light beam is a laser beam, generally the quantity of light of the emitted light beam serves as Gaussian distribution. For this reason, however quick the responsibility of the binary-ized picture signal impressed to the responsibility of the light source for exposure and the light source concerned may be when exposing a picture, making a light beam scan, as for the concentration of the picture on the sensitized material side produced as a result of exposure, it will have inclination [near / the / the profile section], and the trouble that it cannot but become a trapezoidal shape has generated the concentration distribution. This trouble makes the trouble of blurring the edge of the picture recorded after exposure / development cause further.
[0005] Drawing 10 illustration-ized the negative sensitized material for this point typically as an example. As for this drawing (a), (d) shows the time-axis which (e) gives the scan time of a light beam for the concentration distribution of the picture on the sensitized material [light exposure / which (c) totals the quantity of light of (b) and is obtained in the quantity of light distribution of each light beam to which (b) scans a sensitized material side top for the brightness of the light source for exposure] side according to the light exposure of (c), respectively. As a result of changing from the value from which brightness is equivalent to L level of an exposure signal at time T1 to the value equivalent to the H level here, while image formation of the light beam is carried out on a sensitized material side As a result of changing

from the value from which a light beam has a sensitized material side top scanned along with a scanning direction in connection with the subsequent passage of time, and brightness is equivalent to H level of an exposure signal at time T2 to the value equivalent to the L level, the case where luminescence of a light beam stops is shown. In this case, light exposure became uneven (this drawing (c)), and inclination has arisen in the concentration distribution at the time near the fall change near the start change of brightness (time T1 - time T1') (time T2' - time T2) (this drawing (d)).

[0006] In addition, in the case of a positive sensitized material, the concentration distribution becomes what reversed the distribution of drawing 10 (d), and the same problem produces it.

[0007] As mentioned above, in the profile section of the picture exposed on a sensitized material side, the profile section (edge section) of the pattern which light exposure will run short compared with the case of the center section, consequently was recorded will fade, and it will be visible. this profile section -- fading -- in the case of a character or a line drawing, the picture recorded arises notably especially And the degree of influence to the profile section of such a record picture being called what becomes large in proportion to the scan speed of a light beam, and removing this influence is the trouble which cannot be bypassed in the equipment which records a picture by the scan of a light beam.

[0008] This invention is conquered considering the pending question [be] matter at the time of exposure as the theme. That is, it sets it as the purpose to improve the ununiformity of light exposure and to make emphasis of the profile section of a record picture realizable.

[0009]

[Means for Solving the Problem] Invention according to claim 1 relates to the image recording equipment which records a picture by scanning a light beam to a sensitized material. A binary-ized picture signal output means to output the binary-ized picture signal which has the 2nd level which serves as size from the 1st level and the 1st level of the above, A differential signal generation means to generate the differential signal which appears when changing from the 1st level of the above to the 2nd level among the signals which differentiate the aforementioned binary-ized picture signal and are acquired based on level change of the aforementioned binary-ized picture signal, An exposure signal generation means to generate the exposure signal which has the 3rd level which compounds the aforementioned binary-ized picture signal and the aforementioned differential signal, and serves as size from the 1st level of the above, the 2nd level of the above, and the 2nd level of the above, It has a light beam discharge means to emit the aforementioned light beam of the quantity of light according to each level of the impressed aforementioned exposure signal.

[0010] Invention according to claim 2 is set to invention according to claim 1. Within a time [of the time of the 2nd level change on the 1st level of the above of the aforementioned binary-ized picture signal from the 2nd level of the above from the time of only predetermined time having passed since the time of the 1st level change on the 2nd level of the above of the aforementioned binary-ized picture signal from the 1st level of the above] integrates with a predetermined signal. It has further an integration signal generation means to output the integration signal generated by the integration concerned. And it is a means to be a time constant shorter than the time of the aforementioned differential signal generation ******, with to generate, and the aforementioned exposure signal generation means is a means to generate the aforementioned exposure signal by composition with the aforementioned binary-ized picture signal, the aforementioned differential signal, and the aforementioned integration signal.

[0011] A 1st differential signal generation means by which the aforementioned differential signal generation means in invention according to claim 1 generates the aforementioned differential signal in invention according to claim 3 according to the 1st level change on the 2nd level of the above of the aforementioned binary-ized picture signal from the 1st level of the above, A 2nd differential signal generation means to generate the aforementioned differential signal based on the aforementioned binary-ized picture signal to within a time [of the time of the 2nd level change on the 1st level of the above of the aforementioned binary-ized picture signal from the 2nd level of the above from the time of only predetermined time having passed since the time of the aforementioned 1st level change] is included.

[0012] Invention according to claim 4 is image recording equipment which records a picture for the light beam by which the quantity of light was controlled on the aforementioned sensitized material a scan and by exposing to a sensitized material with an exposure signal. as the aforementioned exposure signal While changing from the 1st level equivalent to the aforementioned exposure level to the 2nd level through the 3rd level While using after that the signal which changes from the 2nd level of the above to the 1st level of the above again through the 3rd level of the above, the above 1st, the 2nd, and 3rd level has satisfied the relation of < (1st level of the above) (2nd level of the above) < (the 3rd level of the above).

[0013]

[Function]

(Invention concerning a claim 1) In response to the binary-ized picture signal which a binary-ized picture signal output means outputs, among the signals which differentiate the binary-ized picture signal concerned and are acquired, a differential signal generation means generates the differential signal which appears when a binary-ized picture signal changes from the 1st level to the 2nd level, and outputs it to an exposure signal generation means. Furthermore, an exposure signal generation means generates the exposure signal which has the 3rd level which serves as size from it of the 2nd level by compounding both the signals concerned in response to a binary-ized picture signal and the above-mentioned differential signal. That is, since the above-mentioned differential signal is produced at the time of the level change on the 2nd level of a binary-ized picture signal from the 1st level, the level of the above-mentioned exposure signal increases by the level of the above-mentioned differential signal further rather than the level of a binary-ized picture signal in the profile section of a picture. Consequently, since only the quantity of light with which the quantity of light of the light beam which a light beam discharge means emits according to each level of an exposure signal is equivalent to a part for the level of a differential signal increases, the edge of the concentration in the profile section becomes sharp.

[0014] (Invention concerning a claim 2) A differential signal generation means outputs the differential signal concerned to an exposure signal generation means, after generating the same polar differential signal as the 2nd level synchronizing with the 1st level change of the binary-ized picture signal which a binary-ized picture signal output means outputs. On the other hand, in response to a binary-ized picture signal, within a time [of the time of only predetermined time having passed since the time of the 1st level change to the time of the 2nd level change] integrates with a predetermined signal, and an integration signal generation means outputs the acquired integration signal to an exposure signal generation means. Therefore, an exposure signal generation means performs composition with the integration signal to be generated by the time of the 2nd level change from the time of only predetermined time having passed since the time of a binary-ized picture signal, the differential signal generated at the time of the 1st level change of a binary-ized picture signal, and the above-mentioned 1st level change. And an exposure signal generation means is outputted to a light beam discharge means by making the signal after composition into an exposure signal. Consequently, the quantity of light of the light beam which a light beam discharge means emits As compared with the case where a binary-ized picture signal is directly impressed to a light beam discharge means, within the time when only the time constant has passed since the time of the 1st level change of a binary-ized picture signal Since only the quantity of light equivalent to the level of a differential signal increases and only the quantity of light equivalent to the level of the integration signal increases in within a time [to which composition with an integration signal is performed further], the edge of the concentration in the profile section becomes sharp.

[0015] (Invention concerning a claim 3) Synchronizing with the 1st level change of the binary-ized picture signal which a binary-ized picture signal output means outputs, the 1st differential signal generation means generates a differential signal, and outputs the differential signal concerned to an exposure signal generation means. On the other hand, in response to a binary-ized picture signal, the 2nd differential signal generation means generates a differential signal to within a time [of the time of only predetermined time having passed since the time of the 1st level change to the time of the 2nd level change], and outputs it to an exposure signal generation means. Therefore, an exposure signal generation means performs composition with the differential signal to be generated by the time of the 2nd level change from the time of only predetermined time having passed since the time of a binary-ized picture signal, the differential signal generated at the time of the 1st level change of a binary-ized picture signal, and the above-mentioned 1st level change. And the exposure signal generation means is outputted to the light beam discharge means means by making the signal after composition into an exposure signal. Consequently, the quantity of light of the light beam which a light beam discharge means emits As compared with the case where a binary-ized picture signal is impressed to a direct light beam discharge means, by within a time [to which the first composition is performed from the time of the 1st level change of a binary-ized picture signal] Since only the quantity of light equivalent to the level of a differential signal is increasing and only the quantity of light equivalent to the level of a differential signal is increasing also about within a time [to which the next composition is performed further], the edge of the concentration in the profile section becomes sharp.

[0016] (Invention concerning a claim 4) When the level of an exposure signal is in the 1st level, a light beam does not expose a sensitized material. Then, if the level of an exposure signal changes from the 1st level concerned to the 3rd level corresponding to the profile of a picture, the light beam of the quantity of light corresponding to a changed part of (the 3rd level-1st level) will expose a sensitized material. Furthermore, if the level of an exposure signal falls to the 2nd level, according to this, the quantity of light of the light beam which is exposing the sensitized material will also decrease to the value corresponding to the 2nd level concerned. Then, if the level of an exposure signal changes from the 2nd level to the 3rd level again, only in the amount corresponding to a changed part of (the 3rd level-2nd level), the quantity of light of the light beam under scan will increase. When the level of an exposure signal returns to the 1st level again, a light beam stops and exposing a sensitized material.

[0017]

[Example] Drawing 1 is explanatory drawing having shown the principle of this invention. This drawing (a) shows the time-axis (d) indicates a scan time to be for the concentration of the picture by which (c) was exposed in light exposure [in / a sensitized material side / for the brightness of the light source / in (b)], respectively. As shown in this drawing (a), the brightness of the light source is made to increase from time T1 to time T1' by within a time [from time T2' to time T2], and the brightness of the light source is kept being the same as that of the conventional technology in fixed brightness in within a time [from time T1' to time T2']. At this time, total of the light exposure in a scan time (T2-T1) becomes rectangle-like as shown in this drawing (b), and the light exposure of each time t is equalized by the constant rate. In addition, the dashed line drawn in the slash portion in this drawing (b) shows the light exposure in the case of the conventional technology. Therefore, the concentration distribution at the time of using a negative sensitized material serves as a convex type configuration as shown in this drawing (c), and the edge of the concentration of the profile section is sharp-ized, without fading.

[0018] As mentioned above, if the light source which has the degree of ** as shown in this drawing (a) could be realized, it was understood that the purpose of this invention can be attained. This means that what is necessary is just to impress the exposure signal which gives the level change corresponding to the degree distribution of ** of this drawing (a) to the light source for exposure as a modulating signal of a light beam. Then, next in this invention, how such an exposure signal is realized concretely poses a problem. Below, some examples about this point are explained one by one.

[0019] Drawing 2 and drawing 3 show the portion common to each example which is drawing having shown typically the composition of the image recording equipment which is one example of this invention, and is mentioned later. And the block diagram of drawing 2 shows the electric composition of image recording equipment, and the perspective diagram of drawing 3 shows the scanning section of the equipment concerned. However, drawing 3 is drawn in order to make the state of a scan of a light beam LB easy to understand notionally, therefore it is omitting illustration-ization all over these drawings, such as the rolling mechanism and its rotation detecting element of the cylinder drum 6, and a move mechanism of the exposure head 7.

[0020] First, in drawing 2 , the binary-ized picture signal output circuit 1 holds binary (L level equivalent to the picture section colored black, and H level equivalent to the non-picture section which is not colored) picture signal (digital) V0D in the memory circles which were prepared in the circuit 1 concerned and which are not illustrated. Hereafter, picture signal V0D is called a binary-ized picture signal.

[0021] This binary-ized picture signal V0D is created from the image data of the subject copy which should be recorded with this equipment, or a pattern. For example, you may be the half-tone-dot signal acquired by changing the image data which read the picture of a subject copy or a pattern with the input scanner, and was obtained by this as binary-ized picture signal V0D with the so-called dot generator. The dot generator is creating the half-tone-dot signal which consists of binary [of the above-mentioned L level and H level] by comparing each level of a screen pattern signal and the level of image data which it holds one by one in that case.

[0022] A controller 3 performs read-out control of such binary-ized picture signal V0D, and the controller 3 is performing the above-mentioned read-out control by outputting the read-out control signal VR to the binary-ized picture signal output circuit 1. The controller 3 has CPU3A and memory 3B. In this memory 3B, the data about each time constant mentioned later are stored.

[0023] The wave processing circuit 2 is the nucleus portion of this invention, and is a portion into which the wave generates the exposure signal IE (current signal) which has a configuration corresponding to drawing 1 (a) from binary-ized picture signal V0D as a digital signal. and the concrete composition of this wave processing circuit 2 -- this example is classified into each the 1st to 3rd example described below according to how Similarly the portion which controls the wave processing circuit 2 is a controller 3. That is, a controller 3 outputs the time constant setpoint signals VC1-VC3 which set up the pixel clock signal VCL and each time constant to the wave processing circuit 2.

[0024] The light source 4 for exposure (it corresponds to a light beam discharge means) is a light emitting device which drives with the exposure signal IE and emits light in a light beam LB. Here, solid-state light emitting devices, such as laser diode (LD) and light emitting diode (Light Emitting Diode), are used as the light source 4 for exposure.

[0025] Next, a general view of drawing 3 arranges the light source 4 for exposure of drawing 2 in the exposure head 7 (not shown [an arrangement state]). Moreover, in the exposure head 7, the lens for image formation for carrying out image formation of the light beam LB to a sensitized material 5 (not shown) is prepared. This exposure head 7 moves in the direction Y of vertical scanning with the drive which is not illustrated. On the other hand, vacuum adsorption of the sensitized materials 5 (a film, printing paper, PS plate, etc.) is carried out at the peripheral face of the cylinder drum 6. This cylinder drum 6 also rotates to main scanning direction X with the drive which is not illustrated. Therefore, the light beam LB by which carried out outgoing radiation and image formation was carried out on the sensitized material 5 from the exposure head 7 is scanned by rotation of the cylinder drum 6 to main scanning direction (-X). And synchronizing with one rotation of the cylinder drum 6, the exposure head 7 moves only a predetermined distance in the direction Y of vertical scanning. Thereby, a light beam LB is scanned in the direction Y of vertical scanning.

[0026] Below, it divides into three examples and the concrete composition and operation of the wave processing circuit 2 are explained one by one. Drawing 4 showed the 1st example.

[0027] In this drawing, the wave processing circuit 2 has D/A converter 9, the integration signal generation section 10, the differential signal generation section 14, the exposure signal generation section 19, the delay circuit 15, and the S/H (sample hold) circuit 16.

[0028] D/A converter 9 is the circuit which changes digital binary-ized picture signal V0D into the binary-ized picture signal V0 of an analog, for example, L level is changed into 0 v and H level is changed into R v. The integration signal generation section 10 It synchronizes with the fall (change on L level from H level) of the output signal V4 of the S/H circuit 11 which carries out sample hold of the binary-ized picture signal (analog) V0 to the timing of the pixel clock signal VCL (period T), and the S/H circuit 11. Stop synchronizing with the fall (change on L level from H level) (the 2nd level change) of the delayed binary-ized picture signal V1 which mentions later the output signal V5 of the integrating circuit 12 which starts integration processing of a predetermined signal (constant-voltage signal), and an integrating circuit 12. It consists of the gate circuit 13 as a limiter. Here, the time constant tau 2 of an integrating circuit 12 is set up by the time constant setpoint signal VC 2. A thing with the voltage-source section which outputs a predetermined voltage signal as composition of an integrating circuit 12 synchronizing with the fall of the binary-ized picture signal V4 by which sample hold was carried out, for example, the capacitor section which has the capacity of the adjustable or the fixed value connected to the voltage-source section, and the resistance section in which an end has the fixed value or the adjustable resistance by which the capacitor section and the other end were grounded can be mentioned.

[0029] On the other hand, a delay circuit 15 and the S/H circuit 16 generate the binary-ized picture signal (analog) V1 for which only the time delay to which the binary-ized picture signal V0 is given with a time constant tau 1 was delayed. That is, a delay circuit 15 is delayed in the pixel clock signal VCL, generates new pixel clock signal VDCL, and the S/H circuit 16 carries out sample hold of the binary-ized picture signal V0 according to the timing of pixel clock signal VDCL, and it generates and outputs only the time constant tau 1 which the time constant setpoint signal VC 1 gives for the binary-ized picture signal V1 for which only the time constant tau 1 was delayed to the signal V0 concerned.

[0030] The inside of the signal which the differential signal generation section 14 differentiates the binary-ized picture signal V1, and is acquired, The differential signal V3 which appears at the time of the start (change on H level from L level) of a binary-ized picture signal It is the portion generated according to level change of the binary-ized picture signal V1, and, for the reason, is a differential circuit 17 (for example, with the capacitor section which has the fixed value or an adjustable capacity which the binary-ized picture signal V1 inputs). The end was grounded and it has a circuit and a clamping circuit 18 equipped with the resistance section which has resistance of the adjustable or the fixed value with which the other end was connected to the capacitor section. In addition, the time constant tau 3 of a differential circuit 17 is set up by the time constant setpoint signal VC 3.

[0031] Moreover, the exposure signal generation section 19 has the adder circuit 20 which adds or compounds each signals V1, V3, and V6 (voltage signal), and the V/I converter 21 which amplifies by changing the output signal VE (voltage signal) into the exposure signal IE as a current signal.

[0032] Here, it depends for each time constants tau1, tau2, and tau3 mentioned above on each factor, such as a size of the exposure pixel by which image formation is carried out on the area of the scan speed of a light beam LB, or the light-emitting part of the light source 4 for exposure, or a sensitized material side, or the number of scanning lines, and the optimal set point of each time constants tau1, tau2, and tau3 is determined in consideration of these factors. An operator does not make the setup concerned beforehand and those set points are stored in memory 3B of drawing 2 after determination using the input unit which is not illustrated. However, time constants tau1 and tau3 need to satisfy the relation between tau1<T, tau3<T, and (tau1+tau3) <T, and time constants tau1 and tau2 need to satisfy the relation of tau1<tau2, respectively.

[0033] Next, the operating sequence of this wave processing circuit 2 is serially explained based on the timing chart of drawing 5 , referring to drawing 4 . This drawing (a) shows an example of the binary-ized picture signal (analog) V0 which has binary [of L level (the 1st level) and H level (the 2nd level)] here. (c) hereafter pixel clock signal VDCL for which, as for (b) of this drawing, only the time constant tau 1 was delayed in the pixel clock signal VCL of a period T (d) the binary-ized picture signal V1 which has binary [of L level (the 1st level) and H level (the 2nd level)] (e) the differential signal V3 whose (f) is the output signal of a clamping circuit 18 about the output signal V2 of a differential circuit 17 The time-axis (i) indicates the exposure signal (composite signal) VE as an output signal of an adder circuit 20, and (j) indicates horizontal-scanning time to be for the integration signal V6 whose (h) is the output signal of a gate circuit 13 about the binary-ized picture signal V4 to which sample hold of the (g) was carried out is shown respectively.

[0034] First, if the pixel clock signal VCL starts in time t1, synchronizing with this, the S/H circuit 11 will carry out sample hold of the binary-ized picture signal V0. Consequently, an output signal V4 is held by H level. Moreover, as for a delay circuit 15, only a time constant tau 1 delays the pixel clock signal VCL.

[0035] Then, in the time t2 when only the time given with the time constant tau 1 concerned passed, if pixel clock signal VDCL starts, synchronizing with this, the S/H circuit 16 will carry out sample hold of the binary-ized picture signal V0, consequently the level of the binary-ized picture signal V1 will be held by H level. That is, the binary-ized picture signal V1 changes from L level to H level. And as a result of impressing the binary-ized picture signal V1 held by H level to a differential circuit 17, from time t2, a differential circuit 17 is a time constant tau 3, with starts differential processing of the voltage signal of H level. The clamping circuit 18 is set up here so that the signal of right potential may be clamped to the inputted signal. Therefore, the signal V2 outputted to within a time [from the time t2 which it is at the standup time (at the time of the 1st level change) of the binary-ized picture signal V1 to time (t2+tau3)] from a differential circuit 17 is outputted from a clamping circuit 18 as a differential signal V3 as it is.

[0036] On the other hand, by within a time [by time t1 - time (t2+tau3)], an integrating circuit 12 is not driven but an output signal V5, therefore the integration signal V6 have it in L level. Consequently, an adder circuit 20 outputs the binary-ized picture signal V1 as an exposure signal VE in within a time [by time t1 - time t2], and outputs the addition result of the binary-ized picture signal V1 and the differential signal V3 of right potential as an exposure signal VE in within a time [by time t2 - time (t2+tau3)]. Therefore, in within a time [of time t2 - time (t2+tau3)], the level of the exposure signals VE and IE is higher than H level by the level given by the differential signal V3.

[0037] In within a time [by the time t3 when an output signal V4 falls from time (t2+tau3) to L level], since both the differential signal V3 and the integration signal V6 are in L level, the level of the exposure signals VE and IE is in the same H level as the conventional technology.

[0038] If an output signal V4 falls at time t3, synchronizing with this, an integrating circuit 12 will be a time constant tau 2, with will start integration processing of a predetermined constant-voltage signal. That is, when only predetermined time (T-tau 1) passes from the standup time t2 (at the time of the 1st level change) of the binary-ized picture signal V1 (t3), an integrating circuit 12 performs the integration processing. The wave of the output signal V5 of an integrating circuit 12 serves as a curve shown with the dashed line in drawing 5 (h). And in within a time [from time t3 to time t4], a gate circuit 13 outputs an output signal V5 as an integration signal V6 as it is. On the other hand, the differential signal V3 is still in L level, and the binary-ized picture signal V1 has it in H level. Therefore, in within a time [concerned], an adder circuit 20 outputs the addition result of the binary-ized picture signal V1 and the integration signal V6 as an exposure signal VE, and, for this reason, the level of the exposure signals VE and IE becomes higher than H level by the level given by the integration signal V6. In addition, drawing 5 (i) has described the level (the 3rd level) of the exposure signal VE in time t4 (at the time of the 2nd level change) as H' (>H).

[0039] If the binary-ized picture signal V1 falls to L level in time t4, synchronizing with this, a gate circuit 13 will perform operation which closes the gate. In addition, the fall of the binary-ized picture signal V1 concerned is called the 2nd level change. Therefore, an output signal V5 will be in the state where it was limited to the level in time t4, and will be outputted from a gate circuit 13. Consequently, the level of the integration signal V6 turns into L level after time t4. On the other hand, since the level of the input signal is changed from H level to L level, a differential circuit 17 outputs the negative polar (negative potential) signal V2 corresponding to this change. However, since this negative polar signal V2 is clamped by the clamping circuit 18, it means that the negative polar portion was eliminated as a differential signal V3, and it is still maintained by L level. Therefore, an adder circuit 20 outputs the binary-ized picture signal V1 as an exposure signal VE as it is in within a time [of time t4 - time (t4+tau3)], and the level of the exposure signals VE and IE is maintained by the same L level as the below-mentioned technology (refer to drawing 5 (i)).

[0040] As mentioned above, the level of the exposure signals VE and IE increases by the level of the signal V6 concerned by composition with the integration signal V6 in within a time [which is given with the last time constant tau 1 at the time of the fall of the binary-ized picture signal V1] while increasing by the level of the differential signal V3 concerned by composition with the positive polar differential signal V3 in within a time [which is given with a time constant tau 3 from the time of the start of the binary-ized picture signal V Thus, in the meaning of having the level more than H level (the 3rd level), it can be said that the exposure signals VE and IE are signals of three or more values. Therefore, only the quantity of light from which the quantity of light of a light beam LB is equivalent to each level of the differential signal V3 and the integration signal V6, respectively in both the within a time one of time t1 - time t2 and time t3 - time t4 increases, and by this increase, as the light exposure on the sensitized material side under scan is shown in drawing 1 (b), it is equalized by a certain fixed light exposure. Consequently, the edge of the concentration of the profile section of a record picture is sharp-ized.

[0041] Although composition with a signal V1 and the positive polar differential signal V3 concerned was performed immediately after at the time of the start of the binary-ized picture signal V1 and composition with a signal V1 and the integration signal V6 concerned was performed immediately before in the 1st example mentioned above at the time of the fall of the signal V1 concerned, it replaces with this, and it is only one of composition, with you may make it generate an exposure signal. For example, it is made to perform composition with the above-mentioned integration signal V6 as performing composition with a signal V1 and the positive polar differential signal V3 concerned only immediately after at the time of the start of the binary-ized picture signal V1. Therefore, the integration signal generation section 10 in drawing 4 becomes unnecessary. Moreover, you may be this reverse case. At this time, the differential signal generation section 14 in drawing 4 becomes conversely unnecessary. However, in the case of these modifications, there is an effect that the degree of sharpness of the edge of the concentration of one profile section is improved. In this limitation, it can be said that such a modification is also significant.

[0042] Drawing 6 is drawing which hits the 2nd example of the wave processing circuit 2 of drawing 2 and in which having shown the composition of wave processing circuit 2A. Therefore, except that the wave processing circuit 2 is transposed to wave processing circuit 2A of drawing 6 among drawing 2 and the time constant setpoint signals VC1-VC3 are transposed to the time constant setpoint signal VC 4 of drawing 6 in the 2nd example, other components are the same as that of the 1st example. In this 2nd example, the differential circuit of an analog does not generate a differential signal like the 1st example, and the combination of a digital differential circuit, i.e., a logical circuit, is generating the differential signal. And the exposure signal is generated by compounding the differential signal which appears at the time of such 1st level change to the binary-ized picture signal concerned immediately before at the time not only of immediately after but its fall (at the time of the 2nd level change) at the time of the start from L level of a binary-ized picture signal (at the time of the 1st level change).

[0043] Latch circuit 11A to which this wave processing circuit 2A latches binary-ized picture signal V0D to the timing of the pixel clock signal VCL as shown in drawing 6 , latched binary-ized picture signal V1A -- respectively -- the [the 1st and] -- 2 differential signal V4A -- the [the 1st which generates V5A, and] -- 2 differential signal generation sections 30 and 34 and the above-mentioned binary-ized picture signal V1A, the 1st, and the 2nd -- it is divided roughly into the exposure signal generation section 38 which generates the exposure signal IEA which is a signal compounded based on differential signal V4A and V5A

[0044] The delay circuit 31 (it consists of NAND circuits etc.) from which only the time delay to which the 1st differential signal generation section 30 is given with a time constant tau 1 among this delays binary-ized picture signal V1A, Consisting of two gate circuits (an inverter circuit 32 and AND circuit 33), the 2nd differential signal generation section 34 consists of the delay circuit 35 (it consists of NAND circuits etc.) and two gate circuits (the inverter circuit 36 and AND circuit 37) which similarly make a time constant tau 1 a time delay. And the time constant setpoint signal VC 4 which the controller 3 of drawing 2 outputs controls a setup of the time constant tau 1 to both the delay circuits 31 and 35. A time constant tau 1 is equivalent to the time constant tau 1 in the 1st above-mentioned example, is based on the scan speed of a light beam, and is determined as it.

[0045] On the other hand, the exposure signal generation section 38 is equipped with three resistance R1-R3 for taking out a voltage signal as a current signal and compounding it, and the amplifier 39 which amplifies the compounded current signal IE 0.

[0046] Hereafter, operation of this wave processing circuit 2A is explained according to the timing chart shown in drawing 7 , referring to drawing 6 suitably. In addition, (a) - (i) of drawing 7 shows the time-axis which shows binary-ized picture signal V0D, the pixel clock signal VCL, binary-ized picture signal [which was latched] V1A, delayed binary-ized picture signal V2A, binary-ized picture signal V3A delayed further, 1st differential signal V4A, 2nd differential signal V5A, the exposure signal IEA, and a scan time respectively.

[0047] First, if the pixel clock signal VCL starts in time t1A, synchronizing with this, latch circuit 11A will latch binary-ized picture signal V0D, will generate binary-ized picture signal V1A which synchronized with the pixel clock signal VCL, and will output the signal V1A concerned used as H level to an inverter circuit 32 and a delay circuit 31. Consequently, while an inverter circuit 32 reverses the level of binary-ized picture signal V1A to L level and outputting to AND circuit 33, a delay circuit 31 starts the processing by which binary-ized picture signal V1A is delayed only for the time delay of a time constant tau 1. therefore, in within a time [of time t1A - time t2A (=t1 A+tau 1)], the level of binary-ized picture signal V2A is maintained on L level -- having -- thereby -- the 1st and the 2nd -- as a result of the level of differential signal V4A and V5A also being maintained by L level, the exposure signal IEA is maintained by the current level Li (here zero value) equivalent to L level of a voltage signal

[0048] In time t2A (at the time of the 1st level change), if binary-ized picture signal V2A starts on H level (the 2nd level) from L level, to current IE 2 flowing resistance R2, as for the direction of AND circuit 33, holding 1st differential signal V4A is still continued on L level, and current IE 1 will not flow. On the other hand, a delay circuit 35 starts the processing by which only a time constant tau 1 delays further inputted binary-ized picture signal V2A of H level. Therefore, within the scan time of time t2A - time (t2 A+tau 1), although the level of binary-ized picture signal V3A is still in L level, since it is reversed by the inverter circuit 36, as a result of the level of 2nd differential signal V5A which AND circuit 37 outputs changing to H level, current IE 3 flows resistance R3 (IE3=V5 A/R3). Therefore, within the scan time concerned, synthetic current IE 0 serves as IE0=IE2+IE3, and the exposure signal IEA is given by alpha- (IE2+IE3). Here, the coefficient alpha shows the amplification factor of amplifier 39. Thereby, as the level of the exposure signal IEA is shown in drawing 7 (h), it increases from the current level Li (the 1st level) to current level Hi' (>Hi : the 3rd level relevance), and as a result of the quantity of light of a light beam LB (drawing 2) increasing only the quantity of light equivalent to a part for the increase concerned (Hi'-Hi), the light exposure in the scan time concerned is equalized.

[0049] Then, if a delay circuit 35 starts the level of binary-ized picture signal V3A to H level at time (t2 A+tau 1), 1st differential signal V5A will fall from H level to L level, and current IE 3 will not flow. At this time, current IE 1 does not still flow. Therefore, at this time, although it will be given by alpha-IE 2 and the quantity of light of a light beam LB serves as a value corresponding to the current level Hi, since the time (time which takes the field where > light exposure becomes uneven for a light beam LB to scan) of a time constant tau 1 has already passed after operation of the light source 4 for exposure is in ON state, light exposure serves as a uniform value and the exposure signal IE 3 does not produce a problem. And this state is maintained to time t3A in which only the period T has passed since time t1A.

[0050] In time t3A, since binary-ized picture signal V2A is still in H level when binary-ized picture signal V0D in L level is latched and the level of binary-ized picture signal V1A turns into L level, 1st differential signal V4A starts on H level. And the state concerned of 1st differential signal V4A is maintained to time t4A (at the time of the 2nd level change) from which binary-ized picture signal V2A falls to L level. Consequently, in within a time [of time t3A - time t4A], synthetic current IE 0 is given by the sum of current IE 1 and current IE 2, and only the amount to which the current level of the exposure signal IEA is given by = (Hi"-Hi) alpha-IE 1= alpha-V 5 A/R1 increases.

[0051] And since the level of binary-ized picture signal V2A turns into L level after time t4A, each current IE1-IE3 all does not flow, but the light source 4 for exposure will be in an OFF state. Therefore, also in this 2nd example, the shortage of light exposure produced just before the OFF state of the light source 4 for exposure is compensated with the quantity of light corresponding to current level Hi" (the 3rd level), and light exposure is equalized.

[0052] As above, the current level of the exposure signal IEA Before [time t2A] it is in Li level, and is in Hi' level in within a time [of time t2A - time (t2 A+tau 1)]. It is in Hi level, and by within a time [of time t3A - time t4A], it will be in Hi" level, and will be in Li level after time t4A, and it can be said that the exposure signal IEA is a signal of three or more values at this point within a time [of time t2A - time t3A]. and the augend (Hi'-Hi) of current level and (Hi"-Hi) each, and the value of resistance R3 and R1 -- it becomes settled by how Therefore, the augend (Hi'-Hi) of the above-mentioned current level and (Hi"-Hi) are controllable by the 2nd example by adjusting suitably the set point of resistance R3 and R1 to the suitable value which is sufficient for compensating the shortage of light exposure.

[0053] Moreover, in the 2nd example, since only the logic-gate circuit constitutes wave processing circuit 2A especially fundamentally, there is an advantage which can simplify the composition of wave processing circuit 2A.

[0054] Also in the 2nd example, application of the modification described on the occasion of explanation of the 1st example is possible. For example, when wave processing circuit 2A is constituted in drawing 6 , using a delay circuit 35, an inverter circuit 36, AND circuit 37, and resistance R3 as unnecessary (in this case), it is. A delay circuit, without the shortage of light exposure being unsuppliable immediately after ON start of the light source 4 for exposure which requires only the delay circuit 31 small-fire injury student **** of the edge of concentration The edge of the concentration of the profile section which does not produce the shortage of light exposure but corresponds at the time of the scan in front of OFF of the light source 4 for exposure can be sharp-ized.

[0055] Drawing 8 is a block diagram which hits the 3rd example of a wave processing circuit and in which having shown the composition of wave processing circuit 2B. In this 3rd example, it falls with the time of the start of a binary-ized picture signal (at the time of the 1st level change), and from the both sides at the time (at the time of the 2nd level change), a positive polar (right potential) differential signal is generated, and composition with a binary-ized picture signal and a positive polar differential signal is generating the exposure signal in the both sides immediately after the start of the above-mentioned binary-ized picture signal, and in front of a fall.

[0056] Binary-ized picture signal (digital) V0D is changed into the binary-ized picture signal V0 of an analog by D/A-converter 9B as shown in this drawing. And the outgoing end of S/H circuit 11B which carries out sample hold of the binary-ized picture signal V0 is connected to each input edge of a delay circuit 40 and an integrating circuit 41. The time delay in a delay circuit 40 is a time constant tau 1, and the setup is performed by the time constant setpoint signal VC 5 which the controller 3 of drawing 2 outputs. Moreover, the time constant tau 2 (tau1<tau2<T) of an integrating circuit 41 is set up by the time constant setpoint signal VC 6. A time constant tau 1 is also equivalent to the time constant tau 1 stated in the 1st example, and is defined in consideration of the scan speed of a light beam here. And if a time constant tau 1 becomes settled, a time constant tau 2 will be defined so that the above-mentioned relational-expression tau1<tau2<T may be satisfied.

[0057] The outgoing end of both the circuits 40 and 41 is respectively connected to the plus input terminal and minus input terminal of a subtractor circuit 42, and the outgoing end of a delay circuit 40 is further connected also to one input edge of adder-circuit 20B. A subtractor circuit 42 is a portion which generates differential signal V4of binary-ized picture signal V1B B, the outgoing end is connected to the input edge of the clamping circuit 43 which outputs only positive polar differential signal V5B, and the outgoing end of a clamping circuit 43 is further connected to the input edge of another side of adder-circuit 20B. V/I converter 21B is equivalent to the V/I converter 21 of drawing 4 . Among each of these components, a delay circuit 40, an integrating circuit 41, a subtractor circuit 42, and a clamping circuit 43 constitute the differential signal generation section 44, and adder-circuit 20B and V/I converter 21B constitute the exposure signal generation section 45.

[0058] In this example, the differential signal of the delay signal and integration signal of a binary-ized signal (analog signal) uses the fact of corresponding to the signal which has the wave same with having differentiated the so-called step function exactly, i.e., the differential signal of a binary-ized signal.

[0059] Drawing 9 is the timing chart which showed operation of wave processing circuit 2B serially. This drawing (a) Respectively - (i) The binary-ized picture signal V0, the pixel clock signal VCL, Binary-ized picture signal V1B synchronized with the pixel clock signal VCL by carrying out sample hold, The time-axis which shows differential signal V4of integration signal V3of binary-ized picture signal V2B [for which only the time of a time constant tau 1 was delayed], and binary-ized picture signal V1B with which it integrated by integrating circuit 41 B, and binary-ized picture signal V1B B, differential signal V5B which has positive polarity, exposure signal V6B, and a scan time is shown.

[0060] First, in time t1B, if binary-ized picture signal V1B starts on H level from L level, an integrating circuit 41 will start integration processing of H level of binary-ized picture signal V1B, and a delay circuit 40 will start delay processing of binary-ized picture signal V1B of H level. Therefore, in within a time [from time t1B to time (t1 B+tau 1)], binary-ized picture signal V2B is in L level, and binary-ized picture signal V3B becomes a mean value between L level and H level. Consequently, the level of differential signal V4B (=V2B-V3B) to which a subtractor circuit 42 subtracts and outputs both signal V2B and V3B is time t2B (time when the level of differential signal V4B becomes equal to L level.) from time t1B. This time can be substantially called time of level change of binary-ized picture signal V2B. It is in a negative potential in within a time, and becomes right potential in within a time [of time t2B - time (t1 B+tau 1)]. Therefore, positive polar differential signal V5B starts on H level from L level in time t2B, and starts attenuation towards L level from H level after that.

[0061] Furthermore, since the level of binary-ized picture signal V2B reaches H level in time (t1 B+tau 1), in within a time [of time (t1 B+tau 1) - time (t1 B+tau 2)], the relation of V3 B<=V2B is materialized and the level of positive polar differential signal V5B is further decreased towards L level. Consequently, the level of exposure signal V6B turns into middle-level (this level also corresponds to the 3rd level) which is given to L level (the 1st level) by time t2B before [time t2B], and is given to H' level (the 3rd level) by <=(H level) (level of V6B) < (H' level) at time (t1 B+tau 2) from time t2B.

[0062] Then, as a result of binary-ized picture signal V1B's falling from H level to L level in time t3B, an integrating circuit 41 starts integration processing again. Consequently, exposure signal V6B is time t4B (time when the level of differential signal V4B becomes equal to L level.) from time t3B. This time can be substantially called time of level change of binary-ized picture signal V2B. In within a time, it increases from H level to H' level (the 3rd level), and is set to L level after time t4B progress.

[0063] As above, also in the 3rd example, it can say that exposure signal V6B or IEB becomes the signal which has the level of three or more values, light exposure within a time [from time t2B to time t4B] is equalized, and the edge of the concentration of the profile section of a record picture is sharp-ized during the scan of a light beam.

[0064] The edge of concentration [in / the profile section of a record picture / even if it uses which wave processing circuit of the 1st - the 3rd example like, shortage of light exposure is compensated with this image recording equipment, and] described above can be made to sharp-ize.

[0065] In addition, although the scanning section of the image recording equipment illustrated to drawing 3 was called so-called cylinder drum type, it is not limited to this as the scanning section. For example, whenever it scans 1 scan line by scanning a sensitized material side top for the modulated light beam to main scanning direction by optical deflectors, such as a polygon mirror and a galvanomirror, this invention is applicable also to the flat-surface type scanner of sending a sensitized material in the direction of vertical scanning with a roller. Moreover, this invention is applicable also to the so-called cylinder inside type scanner which is made to move the deflecting system concerned in the direction of a medial axis for every scanning end of 1 scan line, and draws a picture, scanning a light beam in the direction of a cylinder of an inside to the sensitized material with which the inside wall of a cylinder drum was equipped by the optical deflector which consists of the reflecting mirror which rotates to the circumference of the medial axis.

[0066] Moreover, as the light source for exposure, gas laser can be used and the exposure signal which a wave processing circuit outputs in this case is used as a control signal of AOM for modulating the light beam oscillated from gas laser. In this meaning, what caught gas laser and AOM in one serves as a light beam discharge means in this case.

[0067] Moreover, it sets in all the examples and modifications that were mentioned above, and although the case where H as the 2nd and 3rd level and H' (or H") level were set as positive polar level was taken and treated, wave processing mentioned above can be performed as a signal which has the negative polarity which reversed the polarity for a binary-ized picture signal or all other signals. In this case, the signal which reverses the polarity of the signal which a wave processing circuit outputs, and is acquired turns into a final exposure signal impressed to a light beam discharge means.

[0068]

[Effect of the Invention] Time until only the synthetic time of an exposure signal and a differential signal passes since the time of emitting the light beam of the quantity of light [invention / concerning a claim 1 / means / light beam discharge] according to the exposure signal, Or only the amount equivalent to the level of a differential signal can make the quantity of light of a light beam increase in within a time until a light beam discharge means terminates discharge of the light beam of the quantity of light according to the exposure signal from a synthetic start-with exposure signal and differential signal under/and generating of light beam time. Consequently, the edge of concentration [in / improvement, one side of the profile section of the picture which can attain completely and is formed in a sensitized material according to the quantity of light concerned, or both sides / for equalization of the light exposure in a sensitized material] can be sharp-ized.

[0069] Time until only the synthetic time of an exposure signal and a differential signal passes since the time of making the light beam of the quantity of light [invention / each / concerning a claim 2 or a claim 4 / means / light beam discharge] according to the exposure signal emit, And the quantity of light of a light beam can be made to increase by within a time until a light beam discharge means terminates generating of the light beam of the quantity of light according to the exposure signal from a synthetic start-with exposure signal and differential signal under generating of light beam time. Consequently, the light exposure in a sensitized material can be equalized and the edge of the concentration in the both sides of the profile section of the picture formed in a sensitized material can be sharp-ized.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any
damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is explanatory drawing showing the principle of this invention.
[Drawing 2] It is the block diagram having shown typically the composition of the image recording equipment which is one example of this invention.
[Drawing 3] It is explanatory drawing having shown typically the scanning section of the image recording equipment shown in drawing 2 .
[Drawing 4] It is the block diagram having shown the example of 1 composition of a wave processing circuit.
[Drawing 5] It is the timing chart which showed operation of the wave processing circuit of drawing 4 .
[Drawing 6] It is the block diagram having shown other examples of composition of a wave processing circuit.
[Drawing 7] It is the timing chart which showed operation of the wave processing circuit of drawing 6 .
[Drawing 8] It is the block diagram having shown the example of composition of further others of a wave processing circuit.
[Drawing 9] It is the timing chart which showed operation of the wave processing circuit of drawing 8 .
[Drawing 10] It is explanatory drawing which pointed out the trouble of the conventional technology.
[Description of Notations]
1 Binary-ized Picture Signal Output Circuit
2, 2A, 2B Wave processing circuit
3 Controller
4 Light Source for Exposure (Light Emitting Device)
5 Sensitized Material
10 Integration Signal Generation Section
11 16 S/H circuit
12 Integrating Circuit
14 44 Differential signal generation section
15 Delay Circuit
17 Differential Circuit
19, 38, 45 Exposure signal generation section
20 Adder Circuit
30 1st Differential Signal Generation Section
34 2nd Differential Signal Generation Section
LB Light beam
VE Exposure signal
IE, IEA, IEB Exposure signal
V0 Binary-ized picture signal
VCL Pixel clock signal

VC1, VC2, VC3, VC4, VC5, VC6 Time constant setpoint signal
tau1, tau2, tau3 Time constant

[Translation done.]